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EXAMINER	
KIELIN, ERIK J	

ART UNIT	PAPER NUMBER
2813	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/042,342	ONG ET AL.	
	Examin r	Art Unit	AW
	Erik Kielin	2813	

-- The MAILING DATE of this communication appears on th cover sh t with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 August 2003*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *6-37* is/are pending in the application.

4a) Of the above claim(s) *35-37* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *6-34* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *9* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

This action responds to the IDS filed 19 May 2003 (Paper no 9) and the Amendment filed 28 August 2003 (Paper no. 11).

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 6-15 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claim 6 recites the limitation,

> "wherein the number of A-substituted thienylene units (I) in the monomer segments is from about 1 to 10, the number of B-substituted thienylene units (II) is from about 0 to 5, and the number of divalent linkages D is 0 to 1, and wherein said polythiophene has a M_n of from about 2,000 to about 100,000." (Underlining in original to indicate amendment.)

It is not possible to have number of (I), (II), and (D) formulas claimed and somehow obtain a number average molecular weight M_n of 2,000 to 100,000. For example, no D or formula (II) monomer segments are required, and a single monomer unit of (I) is not even a polymer; it is instead a monomer, by definition. It cannot have a M_n of 2,000 if it is a single unit. A similar problem exists for

The remaining claims are rejected for depending from the above rejected claims. For the purposes of patentability, independent claim 6 will be interpreted broadly, since the new amendment is not enabling to the originally claimed features.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 8-10 and 16-34 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 8-10, 17, 18, 26, and 27, it is unclear whether or not D is present. For the purposes of patentability, there is an express statement in independent claims 6 and 16 that the number of D monomers is 0 or 1, so it will be assumed that this is true for claims 8-10, 17, 18, 26, and 27, since there is no requirement that D be present.

Regarding claim 16, it is unclear what values m and c may have since a, b, d and n have been defined. For the purposes of patentability, it will be assumed that m and c are at least 1.

Regarding claim 17, the term "optionally" renders the scope of identity of the monomer D indefinite. If D is "optionally comprised of..." then what is D otherwise?

The remaining claims are rejected for depending from the above rejected claims.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims **6**-10, 13, 14, and 17 are rejected under 35 U.S.C. 102(b) as being anticipated by US 5,347,144 (**Garnier** et al.).

Regarding independent claim **6**, and claims 7, 8 and 17, **Garnier** discloses a thin film transistor (TFT), comprising a substrate, gate electrode (called "conducting grid"), gate dielectric, and source/drain electrodes (Abstract; col. 2, lines 20-29; col. 6, lines 19-47) and a semiconductor layer comprising a polythiophene derived from monomer segments shown in col. 4, line 35 to col. 5, line 21, labeled as formula "(III)", wherein the source/drain electrodes and gate dielectric layer contact said semiconductor polythiophene. Note that the "conducting grid" necessarily serves as the gate electrode; otherwise the transistor would be inoperable. **Garnier** discloses the polythiophene of formula (III) shown in col. 4, to have the following substituent groups:

X and X' independently represent O, S, Se, Te, or --N(R)--,

R represents H, alkyl, substituted alkyl, aryl, or substituted aryl;

R_1, R_2, R'_1, R'_2, R'_3, and R''_3 each independently represent --H, Cl, F, or a $--CF_3$, $--NO_2$, --CN, $--COOR_3$ group, $--N(R_4)(R_5)$, alkyl, substituted alkyl, aryl, substituted aryl, alkoxy or polyalkoxy,

R_3 represents an alkyl or substituted alkyl group or a metal,

R_4 represents H or an alkyl or substituted alkyl group,

R_5 represents an alkyl, acyl, or aryl group or R_1 and R_2 and/or R'_1 and R'_2 pairs together represent a divalent hydrocarbon group which may be unsaturated or possibly interrupted and/or terminated by at

least one heteroatom,

Y, Y_1, Y_2, and Y_3 independently represent the following groups: --C(R')=C(R")-- --C≡C-- --N(R')-- --N=N-- --C(R')=N-- --N=C(R')--, wherein R' and R" independently represent --H, alkyl, substituted alkyl, aryl, or substituted aryl,

a, b, a', b' are numbers equal to 0 or 1, **or Y_1 may also represent a cyclic or heterocyclic arylene group**, and in this case b=1 and a'=0,

s and t are whole numbers, including zero, of which at least one is different from zero,

m' is a whole number equal to at least 1, the numbers s, t, and m' are such that

m' (s+t)=m,

m being a whole number between 4 and 24.

In the oligomer with formula III, units A and A' can alternate regularly or not. In addition, in a given oligomer, the substituents and/or heteroatoms of the units can be different.

In the instant case, units A and A' in **Garnier** are the equivalent of the instantly claimed units (I) and (II) with X being sulfur (chemical symbol S), thereby making A and A' thiophene units.

The sidechains R_1, R_2, R'_1, R'_2, in **Garnier** are equivalent to the instantly claimed sidechains A and B. Since R_1, R_2, R'_1, R'_2, in **Garnier** may be alkyl, they may have more than 5 carbon atoms which anticipates the A sidechain having at least 5 atoms. Since R_1, R_2, R'_1, R'_2, in **Garnier** may be alkyl, they may have less than 4 carbon atoms which anticipates the B sidechain having 1 to 4 carbon atoms. Moreover, since R_1, R_2, R'_1, R'_2, in **Garnier** may be H, Cl, or F, this anticipates the B sidechain having 1 atom.

Any of Y to Y_3 in **Garnier** corresponds to D of the instant claims. **Garnier** also discloses that the units A and A' may be zero or any whole number which anticipates the instantly claimed

1-10 of (I) and 0-5 of (II). Note that only one of the subscripted Y's or Y is required since a, a', b, and b' may be zero.

The molecular weight may be about 2,000, which overlaps M_n of 2,000 to 100,000.

Regarding claims 7-10, although irrelevant since D may be equal to 0, in addition to that indicated above, Y (the instantly claimed D) may be may be cyclic or heterocyclic arylene which anticipates the Markush group of D in the instant claims. And A and B of the instant claims corresponds to the **Garnier** R_1, R'_1, R'_2, and R_2 which may be, *inter alia*, alkyl or hydrogen.

Regarding claims 13 and 14, method limitations do not have patentable weight in device claims. Note that a "product by process" claim is directed to the product per se, no matter how actually made, *In re Hirao*, 190 USPQ 15 at 17 (footnote 3). See also *In re Brown*, 173 USPQ 685; *In re Luck*, 177 USPQ 523; *In re Fessmann*, 180 USPQ 324; *In re Avery*, 186 USPQ 161; *In re Wertheim*, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); *In re Marosi* et al, 218 USPQ 289; and particularly *In re Thorpe*, 227 USPQ 964, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. Note that applicant has the burden of proof in such cases, as the above case law makes clear.

7. Claims 6-10, 13, 14, and 17 are rejected under 35 U.S.C. 102(e) as being anticipated by US 6,429,040 B1 (**Bao** et al.).

Regarding claim 6, **Bao** discloses a thin film transistor device comprised of a substrate **10**, a gate electrode **10**, a gate dielectric layer **12**, a source electrode and a drain electrode **13**, **15**, and a semiconductor layer **14** (Fig. 1, col. 6, lines 14-41) comprised of a polythiophene derived from a monomer segment or monomer segments containing two 2,5-thienylene segments, (I) (called "A" in Bao) and (II) (called "B" in Bao at paragraph bridging cols. 3-4), and an **optional** divalent linkage D, wherein A (called "R^1" in Bao) is a side chain with at least about 5 carbon atoms; B (called "R^2 " in Bao) is hydrogen or a side chain with from about 1 to about 4 carbon atoms; and wherein the number of A-substituted thienylene units (I) in the monomer segments is from about 1 to about 10, the number of B-substituted thienylene units (II) is from 0 to about 5, and **the number of divalent linkages D is 0**, and wherein said polythiophene inherently has a M_n of from about 2,000 to about 100,000 because the number of monomer thiophene segments is from 4 to 1000 (col. 4, lines 2-3).

Regarding claim 7, **Bao** discloses that A is alkyl containing from about 5 carbon atoms to about 25 carbon atoms; B is hydrogen or a short chain alkyl containing from about 1 to about 4 carbon atoms, d = 0, and wherein said source electrode and said gate dielectric layer are in contact with said semiconductive layer (Fig. 1; paragraph bridging cols. 3-4).

Regarding claim 8, **Bao** discloses thin film transistor device in accordance with claim 6 wherein A is alkyl containing from about 6 to about 15 carbon atoms; B is hydrogen; and D is arylene containing from about 6 to about 30 carbon atoms; d = 0, and wherein said source/drain electrodes and said gate dielectric layer are in contact with said semiconductive layer (Fig. 1; paragraph bridging cols. 3-4).

Regarding claims 9 and 17, **Bao** discloses that d = 0 making the identity of D irrelevant.

Regarding claim 10, **Bao** discloses that A is hexyl, heptyl, octyl, nonyl, decyl, undecyl, dodecyl, tridecyl, tetradecyl, or pentadecyl; B is hydrogen; and d = 0 and wherein said source/drain electrodes and said gate dielectric layer are in contact with said semiconductive layer (Fig. 1; paragraph bridging cols. 3-4).

Regarding claims 13 and 14, the method by which the transistor is formed does not have patentable weight. Note that a "product by process" claim is directed to the product per se, no matter how actually made, *In re Hirao*, 190 USPQ 15 at 17 (footnote 3). See also *In re Brown*, 173 USPQ 685; *In re Luck*, 177 USPQ 523; *In re Fessmann*, 180 USPQ 324; *In re Avery*, 186 USPQ 161; *In re Wertheim*, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); *In re Marosi* et al, 218 USPQ 289; and particularly *In re Thorpe*, 227 USPQ 964, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. Note that applicant has the burden of proof in such cases, as the above case law make clear.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims **16**-21, and 28-31, 35-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Garnier** in view of US 6,320,200 B1 (**Reed** et al.)

Regarding independent claim **16**, 20 and 21, **Garnier** discloses each of the features of the claimed TFT, as noted above, except the third monomeric unit having the B sidechain which is required to be present in claimed formula (III). The monomer D is, as noted above, anticipated by **Garnier**.

Reed teaches polythiophenes for electrical applications as shown the formulas in cols. 29-32 and teaches the instantly claimed central thiophene monomers in the oligomer having an even number (formula 27) or odd number (formula 23) of the B side chain, wherein B is hydrogen. The substitution of the alkyl (the A sidechains) is also shown to match that of the instant invention, as shown in formula (III) of the instant claims, and is also anticipated by **Garnier**, as noted above since R_1, R_2, R'_1, and R'_2, may be independently varied as at least alkyl and hydrogen, as noted above.

It would have been obvious for one of ordinary skill in the art, at the time of the invention to provide central monomers in the oligothiophene having the hydrogen (B sidechain) in the central portion of the **Garnier** oligomer, in order to provide further control of the conductivity and properties the channel region of the TFT.

Regarding claims 17-19, although irrelevant since D may be equal to 0, in addition to that indicated above, **Garnier** discloses that Y (the instantly claimed D) may be may be cyclic or heterocyclic arylene which anticipates the Markush group of D in the instant claims. And A and B of the instant claims corresponds to the **Garnier** R_1, R'_1, R'_2, and R_2 which may be, *inter alia*, alkyl or hydrogen.

Regarding claim 22, the instantly claimed n corresponds to m' in **Garnier**, which may be 4 to 24, which overlaps 5 to 5,000.

Regarding claims 25-27, the A and D units are as indicated above and are anticipated. Note that D may be zero in accordance with Applicant's claims.

Regarding claims 28-31, the claims are obvious variations of the teaching of **Garnier** in view of **Reed**. Note that the benzyl linkage (monomer D) is anticipated by **Garnier** who teaches that the Y (equal to Applicant's instantly claimed D) is arylene, of which benzene is the most basic and commonly known unit.

10. Claims 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Garnier** in view of **Reed** as applied to claims 16 and 17 above, and further in view of US 5,069,823 (**Sato** et al.).

The prior art of **Garnier** in view of **Reed**, as explained above, discloses each of the claimed features except for the number and weight average molecular weight ranges of the polythiophene.

Sato teaches the production of electrically conductive polythiophenes such as those disclosed by the general formula (III) in **Garnier**, wherein the weight average molecular weight is between 60,000 and 100,000 which overlaps the instantly claimed ranges (See Abstract; col. 1, lines 19-33.) Because of the relationship between the number and weight average molecular weights, it is held, absent evidence to the contrary, that the number average molecular weight inherently overlaps those instantly claimed in claims 23 and 24 because of the **Sato** weight average molecular weights. (See MPEP 2112.)

It would have been obvious for one of ordinary skill in the art, at the time of the invention to use the molecular weight for the polythiophene of **Garnier** in view of **Reed** as that taught in **Sato** as a matter of routine optimization. (See MPEP 2144.05.)

11. Claim 34 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Garnier** in view of **Reed** as applied to claim 16 above, and further in view of US 6,232,157 B1 (**Dodabalapur** et al.).

Garnier discloses that the thickness of the gate dielectric (called "insulating layer") is 0.5 to 10 μm and the thickness of the polythiophene (semiconductor) may be 20 to 200 nm (col. 6, lines 48-54) which overlaps that instantly claimed. **Garnier** also teaches the thickness for the source/drain electrodes of 25 nm (col. 7, lines 27-30) which is near than instantly claimed.

Garnier in view of **Reed** does not teach the thickness of the substrate to be 10 μm to 10 millimeters.

Dodabalapur teaches a TFT and method for forming having polythiophene as the semiconductor channel wherein the substrate is made from plastic and is 30 to 100 μm, which overlaps that instantly claimed (col. 7, lines 9-11).

It would have been obvious for one of ordinary skill in the art, at the time of the invention to use the substrate thickness of **Dodabalapur** as the substrate thickness in **Garnier** in view of **Reed**, because **Garnier** is silent to the thickness of the plastic substrate such that one of ordinary skill would be motivated to use conveniently known thicknesses which are readily available and already used for TFTs such as those in **Dodabalapur**.

Although the source/drain electrode thickness is not exactly as claimed, it would be an obvious matter of routine optimization to use the instantly claimed range because it has been held that claimed ranges of a result effective variable, which do *not* overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art. See *In re Huang*, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996). In the instant case, **Garnier** is not limited to the exemplary thickness and Applicant has provided no evidence to indicate that there exists anything critical to the thickness range presently indicated. It would have been obvious for one of ordinary skill in the art, at the time of the invention to optimize the thickness of the source/drain electrodes for a particular dimension TFT.

12. Claims **6**-14, 17 and **16**, 18, 19, 22-27, 32-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,500,537 (**Tsumura** et al.) in view of US 5,069,823 (**Sato** et al.).

Regarding claim 6, **Tsumura** discloses a thin film transistor device comprised of a substrate **1**, a gate electrode **2**, a gate dielectric layer **3**, a source electrode and a drain electrode **4**, **5**, and a semiconductor layer **6**, **7** comprised of a polythiophene derived from a monomer segment or monomer segments containing two 2,5-thienylene segments, (I) and (II), and an optional divalent linkage D, wherein A (called "R_1" or "R_2" in Tsumura formula (3)) is a side chain with at least about 5 carbon atoms; B (called "R_3" or "R_4" in Tsumura formula (3)) is hydrogen or a side chain with from about 1 to about 4 carbon atoms; and D is a divalent linkage, and wherein the number of A-substituted thienylene units (I) in the monomer segments is from

about 1 to about 10, the number of B-substituted thienylene units (II) is from 0 to about 5, and **the number of divalent linkages D is 0**.

Tsumura is silent to the molecular weight.

Sato teaches a conducting polythiophene for use in electronic applications (Abstract; col. 1, lines 7-33) composed of two separate monomer with a short side chain of less than 5 carbons and a long side chain of greater than five carbons and teaches that the weight average molecular weight is 60,000 to 100,000 which inherently overlaps a number average molecular weight (M_n) of 2,000 to 100,000, as admitted by Applicant in the instant specification at least at original claims 22-24.

It would have been obvious for one of ordinary skill in the art, at the time of the invention to use the molecular weight of the **Sato** polythiophene as that of the polythiophene of **Tsumura**, because **Tsumura** is silent to the molecular weight such that one of ordinary skill would be motivated to find a molecular weight that forms a conducting polythiophene to save time and money doing research and development to find a suitable molecular weight. Moreover, the selection of molecular weight is a matter of routine optimization and there exists no evidence in the instant specification that there exists anything critical to the presently claimed molecular weight. (See MPEP 2144.05.)

Regarding claim 7, both **Tsumura** and **Sato** disclose that A is alkyl containing from about 5 carbon atoms to about 25 carbon atoms; B is hydrogen or a short chain alkyl containing from about 1 to about 4 carbon atoms; and D, **when present**, is arylene or dioxyarene, each containing from about 6 to about 40 carbon atoms, or alkylene or dioxyalkane, each containing

from about 1 to about 20 carbon atoms, and wherein said source electrode and said gate dielectric layer are in contact with said semiconductive layer.

Regarding claim 8, both **Tsumura** and **Sato** disclose that A is alkyl containing from about 6 to about 15 carbon atoms; B is hydrogen; and D is arylene containing from about 6 to about 30 carbon atoms, and wherein said source/drain electrodes and said gate dielectric layer are in contact with said semiconductive layer.

Regarding claims 9 and 17, both **Tsumura** and **Sato** disclose that d = 0, so the identity of D is moot, and wherein said source/drain electrodes and said gate dielectric layer are in contact with said semiconductive layer.

Regarding claim 10, **Tsumura** discloses that discloses that A is hexyl, heptyl, octyl, nonyl, decyl, undecyl, dodecyl, tridecyl, tetradecyl, or pentadecyl; B is hydrogen; d = 0 and wherein said source/drain electrodes and said gate dielectric layer are in contact with said semiconductive layer (Fig. 1; paragraph bridging cols. 3-4).

Regarding claim 11, **Tsumura** discloses that said substrate is a plastic sheet of a polyester, a polycarbonate, or a polyimide, said gate, source, and drain electrodes are each independently comprised of gold, nickel, aluminum, platinum, indium titanium oxide, a conductive polymer, and said gate dielectric layer is comprised of silicon nitride, silicon oxide, insulating polymers of a polyester, a polycarbonate, a polyacrylate, a poly(methacrylate), a polyvinyl phenol), a polystyrene, a polyimide, an epoxy resin, an inorganic-organic composite material of nano-sized metal oxide particles dispersed in a polymer, a polyimide, or an epoxy resin; and wherein said source/drain electrodes and said gate dielectric layer are in contact with said semiconductive layer (col. 3).

Regarding claim 12, **Tsumura** discloses that said substrate is glass or a plastic sheet; said gate, source and drain electrodes are each independently comprised of gold; said gate dielectric layer is comprised of an organic polymer of poly(methacrylate), polyacrylate, polyvinyl phenol), polystyrene, polyimide, polycarbonate, or a polyester, and wherein said source/drain electrodes and said gate dielectric layer are in contact with said semiconductive layer (col. 3).

Regarding claims 13 and 14, the method by which the transistor is formed does not have patentable weight. Note that a "product by process" claim is directed to the product per se, no matter how actually made, *In re Hirao*, 190 USPQ 15 at 17 (footnote 3). See also *In re Brown*, 173 USPQ 685; *In re Luck*, 177 USPQ 523; *In re Fessmann*, 180 USPQ 324; *In re Avery*, 186 USPQ 161; *In re Wertheim*, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); *In re Marosi* et al, 218 USPQ 289; and particularly *In re Thorpe*, 227 USPQ 964, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. Note that applicant has the burden of proof in such cases, as the above case law make clear.

Regarding claim 16, **Tsumura** discloses a thin film transistor device comprised of a substrate **1**, a gate electrode **2**, a gate dielectric layer **3**, a source electrode and a drain electrode **4**, **5**, and in contact with the source/drain electrodes and the gate dielectric layer, a semiconductor layer **6**, **7** comprised of a polythiophene represented by Formula (III), wherein A (called "R_1" or "R_2" in Tsumura formula (3)) is a side chain with at least about 5 carbon atoms; B (called "R_3"

or "R_4" in Tsumura formula (3)) is hydrogen or a short side chain containing from about 1 to about 4 carbon atoms; and D is a divalent segment; a and c represent the number of A-substituted thienylenes, wherein a is at least 2; b is the number of B-substituted thienylene units and is from 1 to about 6; **d is 0**; and n is the degree of polymerization or the number of the monomer segments in the polythiophene.

Tsumura is silent to the molecular weight.

Sato teaches a conducting polythiophene for use in electronic applications (Abstract; col. 1, lines 7-33) composed of two separate monomer with a short side chain of less than 5 carbons and a long side chain of greater than five carbons and teaches that the weight average molecular weight is 60,000 to 100,000 which inherently overlaps a number average molecular weight (M_n) of 2,000 to 100,000, as admitted by Applicant in the instant specification at least at original claims 22-24.

It would have been obvious for one of ordinary skill in the art, at the time of the invention to use the molecular weight of the **Sato** polythiophene as that of the polythiophene of **Tsumura**, because **Tsumura** is silent to the molecular weight such that one of ordinary skill would be motivated to find a molecular weight that forms a conducting polythiophene to save time and money doing research and development to find a suitable molecular weight. Moreover, the selection of molecular weight is a matter of routine optimization and there exists no evidence in the instant specification that there exists anything critical to the presently claimed molecular weight. (See MPEP 2144.05.)

Regarding claim 18, both **Tsumura** and **Sato** disclose that A is alkyl containing from 6 to about 25 carbon atoms; B is hydrogen or alkyl containing from 1 to about 3 carbon atoms; and d = 0.

Regarding claim 19, **Tsumura** discloses that A is alkyl containing from about 8 to about 12 carbon atoms, and B is a hydrogen atom.

Regarding claims 22-24, Tsumura is silent to the molecular weight and the degree of polymerization n is from about 5 to about 5,000.

Sato is applied as above regarding the molecular weight.

Regarding claim 25, **Tsumura** discloses that A is hexyl, heptyl, octyl, nonyl, decyl, undecyl, dodecyl, tridecyl, tetradecyl, or pentyldecyl.

Regarding claims 26 and 27, **Tsumura** discloses that d = 0. Accordingly, the identity of D is moot.

Regarding claim 32, **Tsumura** discloses that the substrate is a plastic sheet of a polyester, a polycarbonate, or a polyimide; said gate, source, and drain electrodes are each independently comprised of gold, nickel, aluminum, platinum, or indium titanium oxide; and said gate dielectric layer is comprised of silicon nitride, silicon oxide, insulating polymers of polyester, polycarbonates, polyacrylate, poly(methacrylate), polyvinyl phenol), polystyrene, polyimide, or an epoxy resin (col. 3).

Regarding claim 33, **Tsumura** discloses that the substrate is glass or a plastic sheet; said gate, source and drain electrodes are each independently comprised of gold; said gate dielectric layer is comprised of an organic polymer of polyester, polycarbonate, polyacrylate, poly(methacrylate), polyvinyl phenol), polystyrene, polyimide, or an epoxy resin, or an

inorganic-organic composite of nano-sized metal oxide particles dispersed in a polymer of a polyester, a polyimide, or an epoxy resin (col. 3).

13. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Tsumura** in view of **Sato** as applied to claim 6 above, and further in view of US 6,232,157 B1 (**Dodabalapur** et al.).

The prior art of **Tsumura** in view of **Sato**, as explained above, discloses each of the claimed features except for indicating that the gate, source and drain electrodes are comprised of a conductive ink.

Dodabalapur discloses that metal-containing polymer inks are beneficial to enable easier processing (Abstract; col. 3, lines 44-50).

It would have been obvious for one of ordinary skill in the art, at the time of the invention to use a conductive ink in the TFT of **Tsumura** in view of **Sato** to enable easier processing, as taught by **Dodabalapur**.

14. Claim 34 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Tsumura** in view of **Sato** as applied to claim 16 above, and further in view of US 6,232,157 B1 (**Dodabalapur** et al.).

The prior art of **Tsumura** in view of **Sato**, as explained above, discloses each of the claimed features except for the thicknesses of the material layers.

Dodabalapur teaches a TFT and method for forming having polythiophene as the semiconductor channel wherein the substrate is made from plastic and is 30 to 100 μm, and

thicknesses of the other transistor device features which overlaps that instantly claimed (col. 3, lines 60-62; col. 7).

It would have been obvious for one of ordinary skill in the art, at the time of the invention to use the thicknesses indicated **Dodabalapur** as the thicknesses for the transistor in **Tsumura** because **Tsumura** is silent to the thicknesses of the various device features, such that one of ordinary skill would be motivated to use conveniently known thicknesses which are readily known to work for TFTs, such as those in **Dodabalapur** to thereby save time and money in research and development of thickness. Moreover, there exists no evidence that the thicknesses of the device layer are critical to the practice of the invention. (See MPEP 2144.05.)

Response to Arguments

15. Applicant's arguments filed 28 August 2003 (Paper no. 11) have been fully considered but they are not persuasive.

Applicants arguments are premised on the allegation that Garnier teaches a molecular weight not greater than 2000. This is in error. Garnier teaches a molecular weight not greater than **about** 2,000, which overlaps the presently claimed range. See MPEP 2131.03, which indicates that overlapping ranges are anticipated.

Conclusion

16. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Erik Kielin whose telephone number is 703-306-5980. The examiner can normally be reached on 9:00 - 19:30 on Monday through Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr., can be reached at 703-308-4940. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9318 for regular communications and 703-872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Erik Kielin
Primary Examiner
November 10, 2003